UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,888	11/13/2006	Hiroyuki Tsuda	060247	9923

21874 7590 11/24/2009

EDWARDS ANGELL PALMER & DODGE LLP
P.O. BOX 55874
BOSTON, MA 02205

EXAMINER	
LAM, HUNG Q	

ART UNIT	PAPER NUMBER
2883	

MAIL DATE	DELIVERY MODE
11/24/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/573,888	TSUDA, HIROYUKI	
	Examiner	Art Unit	
	HUNG LAM	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 July 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7,9 and 11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-7,9 and 11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Argument

1. Applicant's arguments filed on July 01, 2009 have been fully considered but they are not persuasive as the following reasons:

2. Regarding to the arguments of claims 1 and 11. The Applicants allege that "neither of the cited references teaches, mentions or suggests the use of temperature control with a heater electrode interposed between a plurality of lens-shaped groove structures for controlling a divergence angle of the propagating light (or a guide direction of light)". The Examiner respectfully disagrees. Clapp et al. teach a heater electrode 19 interposed between a plurality of groove structures 18 provided along the optical path for controlling temperature of filling material in groove structures 18 or in the other words it would changes/controls the refractive index of the filling material, and subsequently a divergence angle or a propagating direction of the propagating light. On the other hand, Kamei et al. teach in figure 32 and figure 40, a pluralities of groove structures can be in lens-shaped (i.e. grooves 418a-418n) or wedge-shaped (i.e. grooves 82a-82n), wherein groove structures are filled with a characteristic compensation material (Kamei et al, [0231] and [0300]). Kamei et al. disclose in a further embodiment (i.e. 10th embodiment with figure 34 and 35) a waveguide comprising a groove 110 filled with a characteristic compensation material (e.g. a temperature compensation material) in region 109 for reducing the electrical power consumption, wherein the temperature of groove 110 or region 109 is controlled by a thin-film heater 107 ([0250],[0251]), therefore, the groove structures would behave the same way of controlled/changed a divergence angle or a propagating direction of the propagating light, as groove structures disclosed by Clapp et al.

3. The Applicants further argue that Kamei et al. "teaches away from the temperature control claimed in the instant application" by citing paragraph [0054]. The Examiner respectfully disagrees. "To eliminate the temperature control..." does not teach away from the claimed invention. Rather, it presents one of a plurality of embodiments of the invention, since paragraph [0056] teaches that "...grooves with material...in order to eliminate the temperature dependent of the transmission wavelength of the arrayed-waveguide grating ((one embodiment)), OR to reduce the electrical power consumption of the thermo-optical switch ((another embodiment)). In a 10^{th} embodiment as illustrated in figure 34, Kamei et al. disclose a waveguide comprising groove 110 filled with a characteristic compensation material (e.g. a temperature compensation material) in region 109 for reducing the electrical power consumption, wherein the temperature of groove 110 or region 109 is controlled by a thin-film heater 107 (Kamei et al., [0250], [0251]). Furthermore, groove structures (e.g. lens-shaped grooves 418a-418n or wedge-shaped grooves 82a-82n) in figure 32 and figure 40 are also filled with the same characteristic compensation material used in region 109 as mentioned above; therefore, they would behave/function in the same way.

4. The Examiner uses the broadest reasonable interpretations in examination claimed limitations presented in claimed languages, and as explained above, therefore, Clapp et al. and Kamei et al is/are still the valid prior arts to the recently amended claims.

5. Accordingly, a new ground of rejection is introduced as necessitated by amendments to above claims accordingly. Please refer to rejection section below for details.

Status of the Application

Claims 2, 8 and 10 have been cancelled.

Claims 1, 3-7, 9 and 11 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-5, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Clapp et al.** (US. Pat. 6,459,533) in view of **Kamei et al.** (US. Pub. 2004/0126052)

Regarding claims 1, 3 and 11, **Clapp et al.** disclose an optical functional waveguide comprising a substrate 10; a clad 11 formed on said substrate 10; a core 16 which is formed in said clad 11 and serves as an optical path for propagating light; a plurality of groove structures 18 formed so as to align at a predetermined interval along the optical path and fragmentize the optical path and being filled with a material having a refractive index temperature coefficient different from that of said core 16; and a heater electrode 19 interposed between said plurality of groove structures 18 provided along the optical path for controlling temperature of filling material in groove structures 18 or in the other words it would changes/controls the refractive index of the filling material, therefore, it would controls/changes a divergence angle or the

propagating direction of the propagating light ("abstract", col. 3 lines 16-23, col. 4 lines 30-49, col. 5 lines 44-47, Fig. 1, Fig. 2 and Fig. 6).

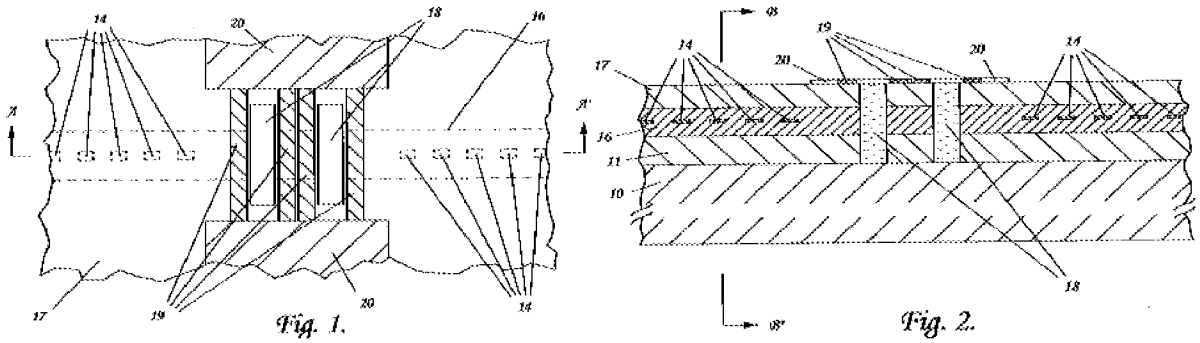

Fig. 1. Fig. 2.

Reproduced from US. Pat. 6,459,533.

Clapp et al. do not explicitly disclose that plurality of groove structures having lens-shaped or wedge-shaped.

Kamei et al. teach optical functional waveguide circuit comprising a cladding layer 42 formed on a substrate 41, a core 43 which is formed in said clad and serves as an optical waveguide/path ([0190], and Fig. 29B); a plurality of groove structures 44a-44d formed so as to align at a predetermined interval along the optical waveguide/path 43 and fragmentize the optical waveguide/path 43 and being filled with a material having a refractive index temperature coefficient different from that said core 43 ([0189], [0192], Fig. 29B). **Kamei et al.** further disclose that pluralities of groove structures can be in lens-shaped (i.e. grooves 418a-418n) or wedge-shaped (i.e. grooves 82a-82n); and at least one of the end faces of said pluralities of groove structures is tilted from a position perpendicular to the optical path, wherein said groove structures act as lenses to magnify and reduce beam spot sizes for lightwave launches through the grooves ([0056], [0222]-[0231], [0296]-[0300], Fig. 32 and Fig. 40). In further embodiment (embodiment 10th with figure 34 and 35), Kamei et al. disclose a waveguide comprising groove

110 filled with a characteristic compensation material (e.g. a temperature compensation material) in region 109 for reducing the electrical power consumption, wherein the temperature of groove 110 or region 109 is controlled by a thin-film heater 107 ([0245], [0250],[0251]); wherein groove structures (e.g. lens-shaped grooves 418a-418n or wedge-shaped grooves 82a-82n) in figure 32 and figure 40 are also filled with the same characteristic compensation material used in region 109 as mentioned above.

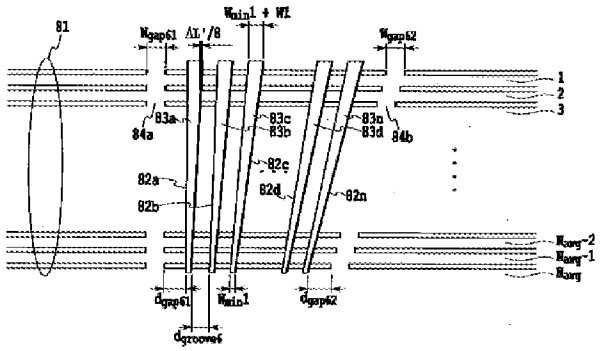

FIG.32

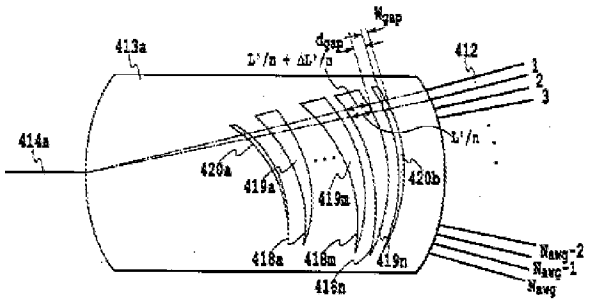

FIG.40

Reproduced from US. Pub. 2004/0126052

It would have been obvious to the one having ordinary skill in the art at the time the invention was made to use the teachings of the serpentine (snake or photo resist patterns) heater electrode patterns of **Kamei et al.** to modify the shape of pluralities of groove structures in **Clapp et al.** wherein the shape of said pluralities of groove structures can either have lens-shaped or wedge-shaped. The motivation for doing so is to reduce the excess loss that involved in the propagation of the lightwave through the slab optical waveguide including the loss components and also for reducing the electrical power consumption (Kamei et al, [0056], [0231], [0245] and [0300]).

Regarding claims 4 and 5, **Kamei et al.** further disclose that an optical modulator comprising the optical functional waveguide according to claim 1 which modulates the phase of

light since "the grating interaction may be changed by a distributed thermally induced phase shift as a function go the heater current" (col. 12 lines 8-18 and col. 16 lines 13-15); and an arrayed waveguide grating 552 comprising the optical functional waveguide according to claim 1 in a slab waveguide 553 (Kamei et al, [0316], and Fig. 42).

Regarding claim 9, in accordance with the rejection of claim 1, **Kamei et al.** further disclose that groove structure 418a-n is provided at a slab waveguide of a coupling portion of the slab waveguide 413a and a single mode waveguide 414a (Kamei et al, [0291]-[0294], and Fig. 39-40).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over and **Clapp et al.** and **Kamei et al.** further in view of **Kurokawa et al**. (US. Pat. 6,122,419).

Regarding claims 6 and 7, **Clapp et al.** and **Kamei et al.** further disclose the claimed invention **except** for a dispersion compensation circuit comprising the optical functional waveguide according to claim 1 in the vicinity of a coupling portion that two arrayed waveguide grating are coupled to each other in a cascade, and a mirror provided in a waveguide and arranged in the vicinity of a spectrum plane wherein the optical functional waveguide according to claim 1 is arranged in the vicinity of said mirror.

Kurokawa et al. teach a dispersion compensation circuit comprising mirror 110 attached to waveguide of slab waveguide 107 of arrayed waveguide grating 200 and arranged in the vicinity of a plane that produce reflecting spectrum where the slab waveguide 107 is attached to that vicinity (col. 24 lines 32-45, col. 30 lines 2-3, and Fig. 20); and **Kurokawa et al.** also disclose a coupling portion 17 a rewritable pattern glass substrate that two array waveguide grating 11 and 15 are coupled to each other in series (col. 21 lines 1-28, and Fig. 10).

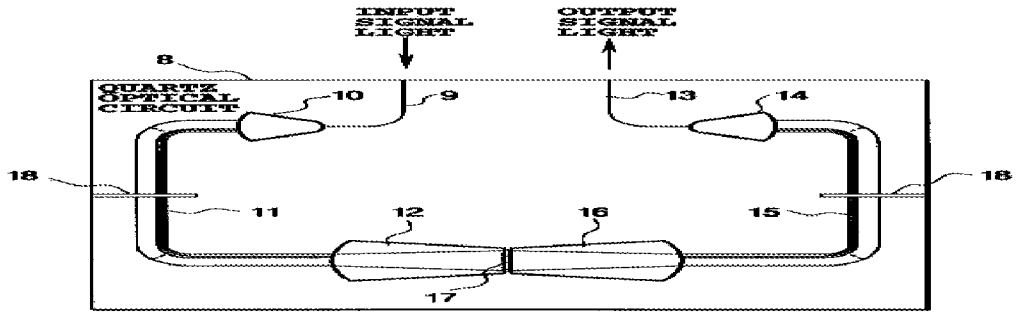

FIG.10

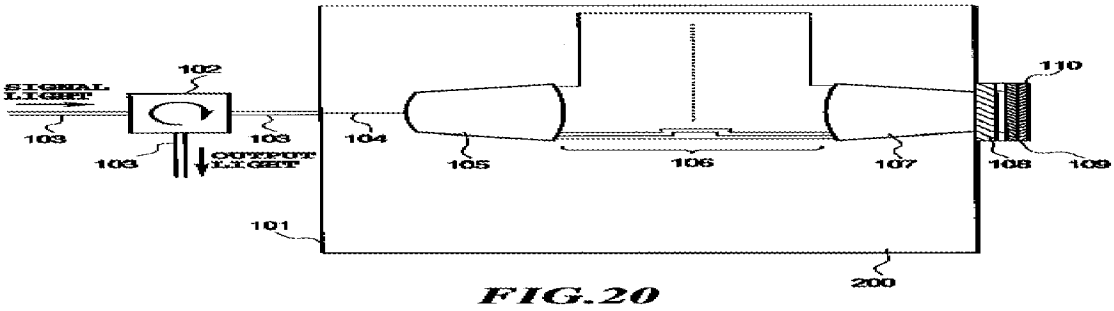

FIG.20

Reproduced from US. Pat. 6,122,419.

It would have been obvious to the one having ordinary skill in the art at the time the invention was made to combine these teachings of **Kurokawa et al**. and using them to modify the device suggested by **Clapp et al.** and **Kamei et al.** by incorporating the optical functional waveguide to a coupling portion of a dispersion compensation circuit that enables two arrayed waveguide gratings to be coupled in series, and further including a mirror provided in a waveguide of the optical functional waveguide that arrange in the vicinity of a plane that produces the reflection spectrum. The motivation for doing so is "to distribute the incident light on a straight line and making desired amplitude or phase modulation of the light according to the position on the straight line and reflecting the light" so that it is possible to control the dispersion compensation amount of a requirement (Kurokawa et al., "abstract", and col. 3 lines 6-9).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Lam whose telephone number is 571-272-9790. The examiner can normally be reached on M - F 08:30 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hung Lam/ Patent Examiner, Art Unit 2883	/CHARLIE PENG/ Primary Examiner, Art Unit 2883